

ART. XV.—*Un mot sur la Fièvre jaune de Lisbonne en 1857.* Par M. le Docteur GUYON. Paris, 1858.

Report on the Pathology, Therapeutics, and General Aetiology of the Epidemic of Yellow Fever which prevailed at Lisbon during the latter half of the year 1857. (Parliamentary Report.) By Dr. ROBERT D. LYONS. London, 1859. Folio.

THE history of all extensive and fatal epidemics is a subject of interest to medical inquirers. Among the diseases which have furnished examples of the most devastating visitations, in this and other countries, the yellow fever deservedly occupies a pre-eminent position. In respect, indeed, to the number attacked, and to the mortality occurring among these, it has been justly doubted whether any disease, the black plague of the fifteenth century and the Asiatic cholera in our days perhaps excepted, can be compared with it. The oriental pestilence itself, as remarked by a late writer, though it occasioned, a century or two ago, a frightful loss of life throughout many parts of Europe, and though it has given rise, up to this day, at each epidemic return, to a mortality equally large, in proportion to the number of individuals attacked, did not, at the time of its widest diffusion, or, if it did, has long ceased to, produce as great a loss as has resulted from the disease in question. It is and has ever been more circumscribed in the sphere of its prevalence, and has appeared less frequently, even in its more legitimate localities.

To the physicians of the United States the yellow fever constitutes an object of special interest, inasmuch as in some of the cities and towns of the middle section of this country it has often prevailed, and to this day continues occasionally to prevail, with wide-spread mortality; while in many more parts of our Southern and Southwestern States it almost annually shows itself in its most awful aspects.

Influenced by these considerations, we have long thought that we might, without fear of trespassing on the patience of our readers, offer a few facts gathered from the materials within our reach relative to the epidemic which prevailed at Lisbon during the autumn of 1857. Until very lately these materials were very scanty—much more so, at least, than could be satisfactory to any one desirous to form correct notions relative to the origin, mode of propagation, and nature of the disease; for little is to be gleaned from the French and English medical journals we have perused, and we have not as yet been fortunate enough to procure any publication issued by the physicians or public authorities of the ill-fated city. Meagre as they were, however, they appeared to us, in the absence of more ample and authentic documents, to possess sufficient value, in view of the importance of the subject, to justify their being embodied in the form of a short essay, and laid before our readers. To our great satisfaction, Dr. Guyon, in the small volume, and Dr. Lyons, in the very able report, the titles of which we have placed at the head of this article, have in most respects filled up the deficiency here referred to, and we gladly avail ourselves of their labours to enlarge and complete what we had originally intended to say on the subject.

The first of these writers, who holds a high position in the medical staff of the French army, resided a long while in Martinique, where he acquired considerable experience in the yellow fever. The series of experiments he instituted to decide the question of the contagiousness or non-contagious-

ness of that disease, as recorded by Dr. Lefort, is well known. In 1826 he published an essay, in answer to one issued by the last-named writer, on the employment of bleeding and bark in the treatment of the fever; and a few years later he produced another, on the medical topography of Gibraltar, and the origin of the epidemic of that city in 1828.

Dr. Lyons was appointed pathologist-in-chief of the British army in the Crimea, and has given, in his able report on the diseases which prevailed among the troops, the most satisfactory evidence of his qualifications to investigate all matters connected with epidemic occurrences such as those he encountered in Lisbon. Like Dr. Guyon, Dr. Lyons undertook a mission to that city to examine into the pathology and origin of the fever prevailing there, and embodied the result of his observations in the report before us, which is addressed, under date of June 1, 1858, to the President of the General Board of Health of London, and published by order of Parliament.

The city of Lisbon is built in the form of an amphitheatre along the margin of the river Tagus. It occupies an irregular group of hills, which extend to the north for a distance of from two to six miles. These hills attain, throughout various parts of the city and suburbs, a height of 330 to 400 feet above the level of the sea.

"On their inland aspect they fall with a more or less rapid inclination towards a depression which forms in part the valley of Alcantara, and which surrounds the city in the greater part of its extent. Beyond this depression the land rises with different elevations, and extending in the directions of northeast and northwest, is subdivided by the valley which passes from Carnide to Loures into two portions of unequal form and extent. One of these divisions lies to the east and northeast, and the other to the west and northwest of the city of Lisbon, being united near Carnide by a neck of high land upon which are divided the waters that flow to the streams of Alcantara and Odivellas respectively."—*Lyons*, p. 64.

Dr. Lyons states that the main hills upon which the city is built may, he believes, be regarded as not exceeding seven in number, though as many as ten or eleven have been enumerated; and if minor subdivisions of the greater and more salient elevations were to be counted, the number might be still further increased. They have a pretty uniform direction from south to north, occasionally deviating to northwest or north-northwest. They all rise with a more or less rapid gradient from a narrow strip of level bordering the Tagus with a serpentine curve, and probably gained from the river bed at no very remote epoch. The hills and intervening valleys have generally, from the above-named disposition, an exposure to the south, south-southeast, and, in some instances, east.

Dr. Lyons enumerates in detail, under the following heads, the causes which appear to operate most prejudicially against the sanitary state of Lisbon: 1. Defective water supply; 2. Defective sewage; 3. State of shore of Tagus; 4. State of uncleanness of streets in certain quarters; 5. Defective construction of houses, as regards sewage, ventilation, &c.; 6. Existence of general slaughter-houses, tanneries, &c.

1. A large part of the city, as we are told, depends for water supply on the aqueduct of Don John V., a very noble work, completed in the year 1738, which withstood the earthquake of 1755, and is well preserved and kept with great attention to cleanliness. The water it delivers is of fair quality; no record of its temperature exists, and Dr. Lyons is not aware of its having been submitted to accurate chemical analysis. Through about a mile and a half of the extent of the aqueduct, which he examined, the water is perfectly free from organic particles, and not the smallest trace of vegetation is to be found in either of the stone channels through which it

flows. It precipitates in these channels an abundant deposit, which assumes a very clear structure in some places, with brilliant crystalline fracture. The water of this aqueduct is conveyed to numerous public fountains throughout various parts of the city, where it is allowed to run day and night; other fountains exist in two or three parts of the city, which derive their supply from the contiguous hills. In the flat of the city numerous wells exist, which give a supply of less pure water, chiefly used for domestic cleansing purposes.

From data furnished to Dr. Lyons, he is of opinion that the water delivered by the aqueduct may be estimated to be under 500,000 gallons per diem. Of the supplies obtained from the fountains fed by independent springs, from wells, and all other sources throughout the city, it is exceedingly difficult to obtain any accurate estimate. But supposing the water supply from all other sources to equal that from the aqueduct, we shall have 1,000,000 gallons of water per diem to meet all the wants personal, domestic, and public, of certainly little less than 250,000 inhabitants.

"The water supply here allowed is, I am persuaded, far above that actually available, yet for the population assumed, 250,000, and this number is probably below the mark, the allowance of water per head per diem is but four gallons." (The usual calculation allows twenty gallons per head per diem in cities but moderately well supplied with water.) "If, allowing for but a very small annual increase, we estimate the population of Lisbon at 300,000, and calculate the required water supply at the moderate average of twenty gallons per head per diem, we shall have 6,000,000 gallons per diem as the quantity necessary for daily consumption for all purposes, personal, domestic and public. This, compared with the actual supply from the aqueduct and all fountains and wells, taken at a maximum of 1,000,000 gallons per diem, shows that the daily supply of water to Lisbon is equal to but one-sixth of the quantity which would be required to place the population in conditions of salubrity as far as this important hygienic element is considered." (67.)

2. The sewers with which Lisbon is supplied may be considered under four heads: *a.* A system of great sewers. They are five in number, and were intended to drain certain quarters of the city. They open upon the shore of the Tagus. *b.* Besides these, three sewers of minor dimensions, not uniform in size or direction, draining smaller areas, and likewise opening on the Tagus. *c.* Lateral branching sewers, serving limited areas, and having communications with one or other of the systems of discharge into the Tagus first specified. *d.* House drains.

The following conclusions are stated as the result of the examinations of the sewers of the three first classes, as executed by the commission appointed for that purpose, as also by Dr. Lyons. The sewers of the third class were in numerous instances found choked with a foul black semi-fluid, and very noisome matter, giving out very fetid gases, which escaped through the ill-arranged wooden valves which these sewers present at several parts of their course. In certain states of the wind the gases were driven back through the sewers and through the streets to great distances. These gases likewise in some instances escaped through apertures in the foot-paths, and other parts of the streets, diffusing a very foul and pestiferous smell, perceptible at considerable distances.

In many instances, the embouchures of the second and even of the first class of sewers are now below the natural level of the part of the shore of the Tagus at which they disembogue, and in some cases the tide has carried quantities of mud and sand a considerable distance into the sewers.

In the great majority of instances, the embouchures of the sewers, when examined at low water, are found to discharge either no fluid at all, or but

an extremely small quantity of it. In some cases, the fluid so discharged had the appearance of pure water, was not discoloured, and was not in any case more than one or two inches in depth, and did not occupy more than half the bottom of the sewer as it flowed out. Dr. Lyons states that in but one instance was a sewer of large dimensions found to sensibly colour the tidal water at its embouchure, when examined during the rise of the tide and at and after high water. At no time did he observe any fluid, except a small quantity of blackish fluid, to flow from the great sewer which leads from the abattoir or slaughter-house and discharges near the custom-house.

"It is estimated that this sewer receives from the Abattoir above 220 gallons nearly of blood per diem, and at least three cwt. nearly, of boyauderie, animal offal, &c. It also receives, or ought to receive, the dejections and refuse of a quarter of the city, comprising at least 60,000 inhabitants—in all, probably not less than 50 tons per diem! What becomes of this enormous quantity of offal and dejecta? Not one-tenth part of it, by the most liberal calculation, finds its way to the embouchure of this sewer."

Deposits of foul black mud, emitting noisome gases, exist at points of some of the great sewers at various distances from their embouchures. A deposit of putrefying fish was found in one of the great sewers, by the "sewer-rat," the foul emanations of which struck his companion down senseless. The sewers of the third class in all probability form the permanent receptacles of the greater part of the dejections, refuse and offal of a population of not less than 250,000.

"Much of the fluid contents of this system of sewers is probably in a state of constant percolation into and through the adjacent soil, while the gaseous elements escape through the ill-arranged wooden valves and through numerous other apertures, and become diffused through the air."

Dr. Lyons states that the entire system of house drainage is defective, whether reference is made to the dwellings of the rich or of the poor. The water-closet system is all but unknown. It is, however, to the dwellings of the poorer classes that the present observations are meant to apply. In several houses which he examined, in quarters the most opposite to each other, throughout the city generally, the following system of house-drain was the sole and exclusive means Dr. Lyons found for removing the dejections and offals of the inhabitants.

"In the main front wall of the house a vertical shaft was carried, in the substance of the wall, from the highest story to the ground. In communication with this tube or shaft, which was usually rectangular and about six inches in mean section, a number of apertures were constructed on the internal face of the wall, which by a short oblique tube led into the main vertical shaft. One of the apertures, quite devoid of any grating, valve or other protection against the entry of refuse of any kind, however large or solid, was to be found on each landing of the staircase which corresponded to a floor. Into this aperture were thrown by the inhabitants of each floor the dejections, fluid or solid, and the refuse and offal of all kinds accumulating daily in a family.

"In some instances the vertical shaft communicated below with a drain or small sewer leading into the nearest street sewer. It constantly happened, however, that there was no such small drain or sewer, and even where present the drain had, in the majority of instances, become choked and obstructed. Either from the absence of a drain and from the drain being choked, as just described, it was a common condition of things to find accumulations of human dejections and refuse of the foulest kind, in greater or less abundance, poured into the open street; a greater or less heap of such filth, corresponding to the external aperture of the vertical shaft, on a level with the ground, and still more of it carried

by a partial flush of rain or other water towards a shallow, gutter-like depression existing in the centre of some streets.

" Supposing this state of things repeated for a number of houses on both sides of a street in thickly inhabited quarters, and with the super-addition of the effects of the *agoa vay* system, by which still further quantities of ordure thrown from the windows become accumulated in the street, and still assuming a continuance of dry and hot weather for a period of weeks together, narrow streets thus become converted into a kind of open gutter, with the decomposing ordure of a dense population exposed to the rays of the sun, and no attempt whatever made to remove such abominations, and some faint idea may be formed of what is a permanent condition of many crowded streets in some parts of Lisbon."

Well may Dr. Lyons conclude, from what precedes, that the whole system of sewage is defective and ineffectual, and that by far the greater part of the solid and liquid dejections, refuse, and offal, of a population of not less than 250,000 inhabitants, is thus allowed to remain in and about their dwellings, vitiating and infecting the atmosphere they breathe. This accumulation of foul abominations, he remarks, is perpetually increasing, and becoming, as it were, year by year, interstratified with the soil of the city. Gaseous exhalations from the whole system of sewers, but more especially those of the third order, are being perpetually given off, and mingle with the atmosphere. (70.)

3. The Tagus forms a bay, or lake-like expanse, some eight or ten miles in its longest diameter, opposite to Lisbon. Its waters are highly charged with a yellowish-brown silt. The stream is but moderately rapid—five to six miles per hour. The spring tides rise to a height of twelve or thirteen feet; the neap tides rise ten or eleven feet. The ebb leaves exposed to low water a considerable extent of shore in the neighbourhood of Lisbon, very foul, muddy, and exhaling mephitic gases, in various parts. From Belem to Apolonia, the extreme limits of the city, from west and east respectively, the distance is nearly five miles. Dr. Lyons says there can be but one opinion as to the neglected state in which the margin of the city is allowed to remain, and the highly prejudicial influence upon the public health exercised by its existing condition. The portion facing the most densely inhabited parts of the city is only partially supplied with well-built quays; in a large extent it is not so protected.

" Gas-works, cotton, and other factories, several markets and waste spaces, serving for the deposit of the city refuse, collected for sale and deportation by water, are placed immediately upon the shore, and here discharge their aggregated debris directly into the Tagus. Innumerable small streams work their way from the adjacent hills, through an open soil, to the river border; there is also, during low water, a continuous outflow of return sea-water, while the various sewers of the 1st and 2d classes, already described, open upon the same line. These combined causes have produced upon a large extent of this shore a deposit of soft, slimy, foul, and blackish mud, in part fecal, in great part composed of decaying vegetable matter, including minute wood fragments, in large abundance; to these elements are to be added—and it constitutes no inconsiderable item—quantities of decaying fish and fish offal. Heaps of fish entrails, and great numbers of the larger and smaller fish, for which there is no demand for sale or for consumption by the fishing population themselves, are daily cast upon the shore; these masses lie for hours, sweltering in the sun, and are but partially removed by each successive tide." (71.)

In one part of the shore the area left uncovered at low water is estimated at about 400 feet from shore to low water mark. The mud is stated to be extremely fetid, and constantly giving off sulphuretted hydrogen and other mephitic gases. It is a blackish, semi-fluid mud, highly charged with

decomposing animal and vegetable matters. Its depth is variously estimated at from about one foot to four and five yards.

The extent and rapidity of the river deposit is such, that it is found necessary to keep a dredging machine constantly in operation, to maintain the basin in the above condition of even moderate freedom from deposit. Without this, it would become in a short time completely filled up.

"The conditions of the shore of the Tagus here described constitute, undoubtedly," as Dr. Lyons adds very justly, "a source of permanent insalubrity, and must be highly prejudicial to the health of the population of the portions of the city in the vicinity of the river. The exhalations given off from the area of foul, putrescent mud, which borders a considerable extent of the city, and which lies exposed for hours to the rays of the sun, are carried by the wind, whenever it has any southing, into the upper parts of the town. No morass can be supposed, which, for purposes of insalubrity, could be made to occupy a more favourable position with regard to any city, for the effectual development and diffusion through a great mass of the population, of its pestiferous emanations, than this foul mud area which borders a large extent of the river margin of Lisbon."

4. It is stated that throughout a large portion of its superficies, Lisbon presents the appearance of a well-paved, well-flagged, and well-macadamized city; that the permanent way is well paved and well kept; and that the condition of the streets, public places, and even of the lanes and alleys in remote and backward quarters, is, in many respects, highly creditable to the authorities. But, it is added, the absence or obstructed state of sewers, the want of privies and of proper house drains, and the system of vertical shafts, before described, all combined with the incorrigible habits of the population, which seems to have never known, or to have completely forgotten, the privacy, delicacy, and retirement, almost universally observed elsewhere, in satisfying the calls of nature, have led to the conversion of the streets, lanes, and alleys, in whole quarters of the city, into the common receptacles for the human dejections, vegetable and animal garbage, and offal of all kinds, of large masses of the population.

"These foul abominations lie exposed to the air and sun till decomposed and trodden into the soil, or partially flushed away by heavy rain falls. Many of the streets of the quarters alluded to are thus converted into permanent lakes. It may be remarked here that the Koprological studies thus forced on the eye of the observer, in so many and such opposite quarters of the city, lead to the conclusion that a confined habit of body has become a constitutional state with a large proportion of the population, both male and female, young and old. Medical testimony unanimously bears out the observation." "The *agoa vay* (water goes) system, so-called from the caution to passers by, shouted from the windows in the nightly process of throwing into the streets the contents of certain domestic utensils, is now confined to the back streets and quarters."

5. Dr. Lyons is justly of opinion that the defects of house construction at Lisbon are important causes of insalubrity, and that the chief of these defects which bear upon our present purpose may be briefly classed as follows: a. The total absence or small and confined state of rear premises in all houses. b. The total absence or imperfect state of privies, sinks, and house drains. c. The want of thorough ventilation and front and rear aeration and lighting. This is especially obvious when, as in the great rectangular blocks of houses which form the superb-looking main streets of the flat of the city, the houses in parallel lines are applied nearly back to back, so that a very narrow interval between the rear of these very lofty five to six storied houses exists, totally inadequate for the purposes of ventilation. The main staircase of many of the finest and most massively built houses

in this and other quarters is pitch-dark at noonday at the first and second landings. A close, confined, and in some instances very foul smell prevails in many of these houses. These conditions are to be understood as occurring in the better class houses as well as in those of the poorer classes; they are, however, still further exaggerated in the case of the latter.

Dr. Lyons, from whom the foregoing statements are borrowed, remarks that Lisbon may be said to be throughout, even in the remoter quarters inhabited by the lower classes, a substantially and even massively built city. If the vices of construction above described were removed, and a good system of sewage and house drainage adopted, it would not be easy to suppose a population of equal extent so well housed, as far as regards the physical elements of their dwellings.

6. The last important cause of insalubrity mentioned by Dr. Lyons is to be found in the existence within the city of the public slaughter-house, tanneries, factories of various kinds, &c. &c. In the general slaughter-house or abattoir—

"The number of animals dispatched annually amounts to from 25,000 to 30,000 head of cattle. This number does not include the pigs annually consumed in Lisbon, which are killed at various places throughout the city and on the opposite shore of the Tagus. The following passage from a report of one of the commissions shows the state of the abattoir in a striking manner: 'The exhalations of the soil (saturated with animal products) were so fetid that they could not be supported by the veterinary officer in charge. I,' says the member of the commission especially charged with the inquiry, 'no sooner received the first breath of them, than I was attacked with vomiting and headache. The vomiting ceased when I withdrew to a distance, but the headache continued until dinner-time.'

To all this the author adds, that although many other causes of insalubrity could doubtless be enumerated, the foregoing are, in his opinion, the most effectively operative. It is, however, to be observed, that some causes of insalubrity met with so constantly in other cities are wanting in Lisbon; as, for instance, intra-mural interments. Three well-organized public cemeteries exist on the outskirts of the city.

Dr. Lyons enters fully upon the general and special climatology of Lisbon. On this subject we cannot, and indeed need not, offer more than a few remarks. He states at the outset that, according to Colonel Franzini's excellent meteorological observations made since 1816, it would appear that at Lisbon the year should be divided as follows: The months of December, January, February, and March form the winter; the spring only lasts during the months of April and May; the true summer continues during June, July, August, and September; and autumn only includes the months of October and November.

The following general conclusions as to mean results, drawn from the observations of sixteen years of the meteorology of Lisbon between the years 1816 and 1840, are recorded by the above cited accomplished academician:—

Barometric Pressure of the Atmosphere.—The mean height of the barometer is stated to be 30.24 inches. In general, the barometer reaches its greatest elevation in the clear days of the winter season, when the prevailing winds are N. and N. E.; its least elevation is during the prevalence of the S. and S. W. winds.

Temperature.—The mean temperature deduced from Col. Franzini's observations respecting the climate of Lisbon is 61° Fahrenheit. This, with slight variations, is the temperature of the month of October. Range from 26° to 105°.

Mean Winter Temperature.—The mean winter temperature, as deduced from the same observations, is 52°.1 (26°—85°).

Mean Spring Temperature.—The mean spring temperature is $60^{\circ}.5$ (37° — 89°).

Mean Summer Temperature.—The mean summer temperature is $70^{\circ}.4$ (48° — 105°).

Mean Autumn Temperature.—The mean autumn temperature is $59^{\circ}.5$ (34° — 83°).

Rain-fall.—The mean annual rain-fall, as given in Franzini's table, is stated at $24\frac{1}{2}$ (nearly) inches. It is elsewhere given as 23 (nearly) inches, distributed over 98 rainy days. Two remarkable extremes were observed— $10\frac{1}{3}$ inches in the driest year, and $36\frac{3}{4}$ inches in the most rainy year.

Rainy Days.—The rainy days, 98 in number, are found to be very unequally distributed. In general, the two months of autumn, October and November, and the first two months of winter, December and January, were the most rainy. June, July, August, and half of September were usually pretty dry.

Winds.—The N. wind prevailed on 144 days; the S. W. on 138 days; the N. W. on 124 days; and all the rest in due proportion. There were 129 days of wind more than usually strong, and 12 days of actual storm.

The foregoing observations may be summed up as follows:—

Barometer (mean) 30.24 inches.

Thermometer (mean) 61° Fahr. Winter (mean) $52^{\circ}.1$; range 26° — 85° . Spring (mean) $60^{\circ}.5$; range 37° — 89° . Summer (mean) $70^{\circ}.4$; range 48° — 105° . Autumn (mean) $59^{\circ}.5$; range 34° — 83° .

Rain-fall (mean) 23 inches (English); range $10\frac{1}{3}$ — $36\frac{3}{4}$ inches.

Rainy days (mean) 98.

Prevailing winds N. N. W. to S. W.

Cold days (mean) 57.

Hot days (mean) 58.

Windy days (mean) 83.

When we compare these results and those obtained in 1855 and 1856 with corresponding ones noticed in 1857, we find slight modifications in the latter year, not unlike those that have occasionally occurred elsewhere during epidemic seasons. The barometrical maxima of 1857 are below those of 1855 in every month except October, November, and December. The minima of 1857 are likewise below those of 1855, except in February, March, May, and December.

The maxima of 1857 are likewise less than those of 1856, except in January, April, June, and July; while, except in May, June, August, October, and December, the minima of 1857 are greater than those of 1856.

In regard to the monthly extremes, we find that the highest maxima were in December, 1856; December, 1857; January, 1855; May, 1855; January, 1857. The lowest minima were in January, 1856; in November, 1857; March, 1856; and February, 1856. In the table of barometric means the highest will be found to occur in December, 1857; June, 1855; January, 1855; July, 1855; and December, 1856. The lowest means were in January, 1856; November, 1857; May, 1857; August, 1857; and October, 1857. The means for March, May, June and August, 1857, are lower than the corresponding ones for both 1855 and 1856. The means of 1857 are greater than those of 1855 only in the months of February, October, November and December, and less in other months; they are greater than those of 1856, in January, April, July, September and December, less in the other months.

The greatest monthly variations were in January, 1856; February, 1855; November, 1857; December, 1856; March, 1856. The least

variations were in July, 1857; July, 1856; August, 1855; July, 1855; and September, 1855. The monthly variations in 1857 were less than those of 1855 and 1856, in February, March, April, July, September, October, and December.

In respect to the thermometric data of 1857, we find from a summary furnished by Dr. Lyons, that in February, March, April, May, July, and October, the maxima of 1857 exceed those of 1855 and 1856. In every instance except one, August, the maxima of 1857 are higher than those of 1855. From February to July, 1857, a steady increase in the maxima is observed; and with the exception of the maximum for June, 1857, which is below that of June, 1856, these maxima are in excess of those of the two antecedent years. It is to be remarked, however, that the maxima of 1857 are, with the exception of those of June, September, November and December, *below* those of 1855 and 1856. The highest maximum for the three years 1855, 1856, 1857, is found to have occurred in July, 1857, when the thermometer marked 99°.50 F.

The variations for February, March, April, May, July, October, and November, 1857, were remarkable; and with the exception of the latter month, in which the variations were considerably less than in 1857, the monthly range of the thermometer was much greater in 1857 than in 1855 and 1856.

In comparing a summary given of the monthly means of 1855, 1856, and 1857, we find an excess in those of April, July, September, October, and November, 1857, over the corresponding ones of 1855 and 1856. This excess, however, is very slight, except in the months of July and November, in which it is 1°.61 and 1°.91 respectively. The means of January, February, March, May, June, August, and December, 1857, are below those of the corresponding months of 1856; while in February, August, and December, 1857, they are below those of 1855. The lowest mean is that of January, 1855; the highest that of July, 1857. The means of the aggregate means for each of the three years 1855, 1856, and 1857, were 58°.362 F.; 60°.792 F.; and 60°.180 F., respectively.

It may be here remarked that the means of 1851 are said to have fallen below those of an antecedent period of 16 years, recorded by Franzini, in all the months except July, September, and November. Dr. Lyons, however, entertains great doubts as to the propriety of comparing the means of 1857, as deduced from the records of the royal observatory, with those of Franzini's 16 years period of observation. His reasons are founded on the higher position of the locality where the former were taken, its exposure to the northwest and east winds, its distance from the Tagus, and other influential circumstances, which have probably the effect of keeping the extreme and mean temperature there below the degree it attains in the proximity of the river, where the denseness of the population, the houses, fires, and above all the reflected heat of the sun thrown back from the amphitheatrically arranged group of hills which border that stream, must unquestionably raise the mean heat of both night and day. The objection would seem to be sustained by the fact that a table exhibiting the mean and mean maxima and mean minima for nine years, deduced from observation conducted by Dr. Martin, in a locality contiguous to the Tagus, to the centres of business and population, and to the main force of the epidemic of 1857—a locality similar to that in which Franzini is supposed by Dr. Lyons to have made his observations—shows that in every instance except one, July, the means of 1857, as recorded at the observatory, are below those of the nine years period in question. They exceed those of Franzini.

In conclusion, Dr. Lyons states that he regards Dr. Martin's observations as entirely reliable, and that they show an excess of temperature in the epidemic months of 1857.

The total fall of rain was less in 1857 than in 1856, and far less than in 1855. The quantity in the last mentioned year was 41.074 inches, the average quantity annually, being 23. In 1856 it was 34.706 inches, and in 1857 only 32.048. In 1855, during the seven last months of the year, the quantity that fell amounted to 497.8 millimetres, about 19 inches. In 1856, it did not exceed, during the same period, 188.1, $7\frac{1}{4}$ inches; while in 1857, during the epidemic months, it rose to 446.0, $17\frac{1}{8}$ inches. No great difference, therefore, presents itself, in that respect, between the yellow fever season of 1857, and the non-yellow fever of 1855; while in 1856, when the disease existed to a limited extent, the quantity of rain that fell was comparatively small. In 1857, the fall prior to June amounted to 367.8 millimetres. In 1856 to 690.6, and in 1855 to 545.5. From this comparison, we may perceive that, so far as the quantity of rain that fell is concerned, nothing can be made out respecting the cause of the severe epidemic of 1857, and of the lesser one of 1856. The same remark is applicable to the degree of the dew-point, elastic force of vapour, and weight of vapour, observed in the months of July, August, September, October, November, and December, of the above mentioned three years; for, on comparing the means of 1854, 1855, and 1856, with those for 1857, we shall obtain the following results for the latter year:—

“July.”—There was an elevation of the dew-point in July, when it reached a maximum, 60.25. The elastic force of vapour was likewise at a maximum in the same month. The weight of vapour to the cubic foot of air was below the maximum in this month, as 5.83 (1857) is to 6.005 (1855).

“August.”—The dew-point in this month was above the minimum (59), but was below the maximum, as 59.2 (1857) is to 60.75 (1854 and 1855). The elastic force of vapour was considerably above the minimum, .373 (1856), but below the recorded results .533 (1854), and .568 (1855), respectively. The weight of vapour to the cubic foot of air was above the minimum, 5.63 (1856), but below the recorded results 6.05 (1854), and 6.075 (1855).

“September.”—The dew-point was higher than in the two preceding years, having reached 60.5 (but not so high as in 1854, when it was 60.75). The elastic force of vapour, .534 was above a minimum, .328 (1856), but below the maximum, .557 (1854). The weight of vapour to the cubic foot of air was below the maximum, 6.08 (1854), but above that of the other years.

“October.”—The dew-point was at a minimum, 54.1. The elastic force of vapour .457, was above the minimum, .306 (1856), but below the results of the other years. The weight of vapour to the cubic foot of air was at a minimum, .508.

“November.”—The dew-point was at a very high maximum, 54.5. The elastic force of vapour was likewise at a maximum, .456. The weight of vapour to the cubic foot of air was also in excess.

“December.”—The dew-point 50, elastic force of vapour .411, and the weight of vapour to the cubic foot of air, 4.62, were all in excess over the similar elements of the corresponding months in the previous years.”

Dr. Lyons observes that, in 1857, the dew-point fell but 10.25 degrees from July to December, and that the minimum depression for the same period, in the three preceding years was 12.85.

From all that precedes, he properly concludes that the Lisbon epidemic of 1857 had no such necessary connection with a high dew-point, as would be made probable from the results obtained by inquiries into the history of other epidemics.

We may mention that the epidemic of 1857 was not the first from which

the city of Lisbon suffered. We have satisfactory proofs that the disease appeared there and prevailed extensively, in the autumn of 1723, during the reign of King John the 5th. The epidemic is described in a Special Essay, by an eye-witness, Dr. S. F. Da Cunha,¹ and is mentioned by several other native writers—José Rodriguez de Avreu, physician of the king; Manuel de Silva Leitão;² Joa Mendes Sachetti, and Duarto Rebello Saldanha. Both de Avreu and Leitão were, like Da Cunha, contemporaries of the epidemic. The latter, after having prevailed during three months, ended on or about the 15th of October, and caused a mortality of six thousand. By Leitão and de Avreu it was designated by the name of *vomito preto*; while Da Cunha applies that denomination to one of the worst and most characteristic symptoms of the fever—the black vomit. The disease is also mentioned, in some detail, by Dr. Gilbert Kennedy, physician to the British Factory at Lisbon, in a letter addressed to Mr. Cayley (H. B. M. Consul), in answer to a communication requesting information on the subject.³ The fever is also alluded to in the Eulogium by Vicq-D'Azyr, of Dr. Rebeiro Sanchez, another eye-witness of its ravages.⁴

Of the yellow fever nature of the disease they encountered, there cannot be the least possibility of doubt. Independently of the fact that most of the authorities cited referred to the black vomit as one of its characteristic symptoms, the description of the complaint left by Dr. Kennedy, and his statement of some of the circumstances attending its development and progress, cannot permit us to admit the possibility of these being applicable to any other form of febrile disease. Let the reader judge for himself. Dr. K. remarks:—

"The heat last summer began late, but continued very violent, and much longer than usual, so that the grapes, which were more plentiful this year than many years past, were burnt up, when pretty ripe. All the summer was sickly, but about the middle of August there appeared the fever which now reigns, accompanied with a pain of the head and loins, a great sickness at the heart and stomach, with retchings to vomit, very contagious in the lower parts of the city, going generally through a family, and very few families escaping, especially in the close, narrow streets. The high parts are much freer than the lower parts, and the villages and country houses about town are entirely free from this dis temper, notwithstanding the great communication. The recovery is generally accompanied with the yellow jaundice. The only mortal symptom in this epidemic is the vomiting of black choler."

The stomach, on dissection, was found to contain a large quantity of this fluid. Leitão states, as a fact well known, that the number of persons who died that year, from the 15th of September to the 15th of December, was over 6000, "most deaths where most dirt," where vapours arose by reason of heat, and the winds which prevailed were from the west; those who were most free were those who lived on the higher parts, and in the larger houses. (p. 43.) Of the same epidemic Da Cunha remarks that the summer of that year was very hot and dry, the autumn partaking of the same character, while the antecedent years likewise had been dry. As the result of this, the city of Lisbon became very sickly, in both its occidental and oriental divisions.

¹ *Discurso e Observações Appolineas, Sobre as doenças que houve na cidade de Lisboa Occidental e Oriental O Outono de 1723.* Lisboa, 1726.

² *Arte com vida ou vida Comarte, per le Dr. Manuel de Silva Leitão.* Lisboa, 1738.

³ Lyons, p. 110. See also Bancroft on the Yellow Fever, 436. The letter is preserved in the British Museum.

⁴ *Hist. de la Soc. Roy. de Méd.*, iv. 215; note. See also the collected works of Vicq-D'Azyr, iii. 225; note.

"The diseases were accompanied with continued fever, pains in the head, and laxity of body, some presenting horripilations, others not, most of them having nausea, without vomiting anything. Some presented anxieties, and in others the superior region of the stomach was painful, so that they would not allow it to be touched. The disease was very acute. Most of the patients vomited black matter, and had dejections of the same kind, and they died on the third, fourth, and fifth days."

It would appear from the statements of de Avreu, that the yellow fever prevailed in 1721, in Ericeira, a village situated at a distance of seven leagues from Lisbon; and in 1728, at Peniche, another village one or two leagues nearer that city. The disease again prevailed, though less extensively, at Lisbon, in the months of August and September, 1724; and finally, from de Avreu we learn that it broke out, and assumed the epidemical form at Funchal, in the island of Madeira, in the year 1738. Some modern writers speak of an invasion and wide diffusion of the disease in Lisbon in 1736; but there is reason to believe, as Dr. Guyon—who has investigated the question—informs us, that the epidemic referred to that year is, in reality, the one described by Da Cunha, and others writers cited, as having occurred in 1723.

More certain is it that the fever prevailed in 1856 in the last-mentioned city, as also at Belem a populous town situated a few miles southeast of the former place. The visitation on this occasion was of somewhat over three months' duration—commencing on the 5th of September, and ending on the 28th of December. The disease presented the same characteristic features as it did the year after; but the yellow fever being unknown to the physicians of the place, the true nature of the cases they observed was not satisfactorily made out by them till the succeeding epidemic, when the phenomena of the prevailing complaint were recognized to appertain to the fever in question; and their similarity to those of the preceding season served to establish the true nature of these. To the end of October there were 100 cases at Belem, and 30 deaths; till the same date there were 63 cases and 16 deaths, and in Rua de la Bica (in the same period) 62 cases and 4 deaths.

In the month of November there were 86 cases and 21 deaths in the Rua St. Roque and Rua de la Bica; a hemorrhagic tendency was generally observed throughout the city. The disease commenced at Belem, in the court of the old custom-house, "and afterwards passed into the Rua de Embaixador. It is stated that the first case of yellow fever which occurred in St. Roque was in the person of a chocolatier (chocolate-maker), who died September 23d." The patient is said to have had no intercourse with persons coming from Oporto (in which place the fever raged), nor with the lazaretto, nor with the custom-house. On the day he sickened he had walked through the market. This patient resided in the Rua St. Roque, No. 60. The fever subsequently appeared in the house No. 57 of the same street, in which it attacked 16 persons.

The number of cases reported at Belem, St. Roque, and Bica, in 1856, amounted to 311, with 71 deaths, or 1 in 4.380.

A case of yellow fever, in a soldier, is reported as having occurred at Oporto, in 1856, as early as the 25th of July. From this date to the 10th of September 70 cases occurred in that city, of which 42 died. It was chiefly confined to the quarter Miragaia, remarkable for its filth and insalubrity.

The epidemic of 1857, like that of 1723, made its appearance during the first fortnight of August. Some cases, indeed, were noticed earlier. But,

as usually occurs under circumstances of the kind, the cases were at first few in number, and their nature was not fully ascertained. One case is recorded as having been verified so early as May; another was seen in July; while there appears to have been at least five in August. The existence of the epidemic was not officially announced till the 9th of September, when three persons were admitted into the hospital, and two deaths were reported. No return of cases occurring in domiciles is found till the 16th and 17th of September, on each of which days one case is recorded. There is then an interval of ten days, during which no return is made of cases in domicile. On the 27th of September 13 cases of the kind were reported, against 44 in hospital. On the 9th of October this proportion had become reversed, the number of those reported being—in hospital 106, in domicile 156. From the 9th of September the disease gradually spread, the cases daily increasing in number. Nevertheless, on the 2d of October the number received in the hospitals since the outbreak of the disease did not exceed 712 (609 males and 103 females). Of these 712 cases 194 died (167 males and 27 females), while 321 remained under treatment (266 males and 55 females).

The epidemic attained its culminating point of intensity, both as regards the number of cases and the mortality, during the second half of October—between the 19th and 28th. The largest number of cases reported, and the greatest loss of life, occurred on the 24th, when the former, both in hospital and private houses, reached the number of 298, and the deaths amounted to 173. On the 19th the mortality was 141, and on the 23d 152; while on the 26th it amounted to 122, on the 27th to 152, and on the 28th to 121.

From the period mentioned (24th) the fever lost its force, and closed its epidemic career about the end of December; though straggling cases continued to present themselves at a subsequent period, and some twenty occurred as late as the early days of March. But though the number of cases diminished in the way mentioned, the disease did not lose its malignancy in a corresponding degree; for the mortality in proportion to the attacks remained to the last much the same as it was at the outset of the epidemic. On the 17th of November the whole number of cases reported from the commencement amounted to 10,556. This number, though large, probably falls short of the real one, inasmuch as many cases may, as has occurred everywhere, have failed to be reported, either designedly or through ignorance, on the part of the medical attendants, of the true nature of the disease. The mortality during the same period is stated, with a greater likelihood to correctness, to have reached 3,550, or about 1 in 3. Dr. Lyons states that, according to the official returns, the totals of attacks, cures, and deaths, to the 25th of December, amounted to 13,481—5,652 in hospitals, and 7,830 in domiciles. Of these, 4,753 died, or 1 in 2.836. In September the cases were 662, and the deaths 190, or 1 in 3.484. In October, cases 6,531, deaths 2,077, or 1 in 3.149. In November, cases 5,327, deaths 2,046, or 1 in 2.603. And in December (to 25th), cases 961, deaths 440, or 1 in 2.184. According to M. Guyon, the whole number of cases, from the outset to the close of the epidemic, exclusive of those occurring among the military, amounted to 19,510. Of these, 5,834 were treated in the hospitals, the rest in private houses. Of the hospital cases, 4,718 were males, and 1,116 females. The whole mortality out of the 19,510 cases reached 6,859. That in the hospitals alone amounted to 2,063—1,679 males, and 384 females. The number of cases among the military at the Marianos Hospital, from the 22d of September to the 31st of December, is stated to have been 585, with a loss of 116. To this must be added 37 cases at the

hospital of Belem. Of these, 2 died; making a total of 622 cases and 118 deaths; being in the proportion of 1 death in 5.271 cases. The garrison of Lisbon is about 4,300, and of Belem 500, which gives us 1 case in 7.4, and 1 death in 40.67. Of British and Irish residents—the total number of whom is not known accurately—28 died, according to an official return to the consulate. By a private return made to Dr. Lyons, through the kindness of the heads of the British and Irish firms, he finds that 47 were attacked (including servants), of whom 20 died. Of the extent of the disease and mortality among the sailors no satisfactory information has as yet reached us. All we know is, that in the marine hospital 47 cases were treated from the 8th of September to the 30th of November, inclusive. Of these, 16 died, 27 recovered, and 4 remained under treatment at the date of the report. Independently of the cases and deaths here mentioned, many—not a few not registered, or, if registered, not officially reported—occurred among foreigners. What the exact number was we are not told. All we can gather on the subject is that of the French alone not less than 35 or 40 died; which, at the usual rates of the mortality, would give from 105 to 120 cases.

Now if, assuming as correct the returns of cases and deaths as given by Dr. Guyon, we sum up the whole of these various items, we shall find that the proportion of deaths to cases amounted to 1 in 2.85. The mortality varied at the several periods of the epidemic from 1 in 2 to 1 in 3. In the hospitals it was 1 in 2.88, and in private practice 1 in 2.65. The population of Lisbon being about 250,000, it follows that the mortality amounted to 1 in 36.42. If, however, we take into consideration that the number of persons who emigrated did not fall short of from 30,000 to 50,000, we discover that the loss in reality reached a much higher proportion.

It may not be improper to remark, in connection with the subject of the mortality occasioned by the yellow fever during this truly memorable epidemic, that many of the cases and deaths here ascribed to the yellow fever ought perhaps to be referred to intercurrent complaints. Dr. Guyon, from whose essay the *foregoing statements are principally borrowed*, would lead us to conclude that the mortality from the prevailing fever was less considerable than we have stated it to have been—the number mentioned having reference to the general loss of life in the city during the progress of the epidemic, and not to that occasioned by that fever alone. In a foot-note at page 20 he informs us that the entire mortality during the whole of the year 1857 was 11,752; and adds, that inasmuch as the mean loss of life during each of the fourteen years anterior to 1856 (1842–1855) was 6,985, it follows that the excess of mortality in 1857—4,767—must be regarded as representing the abnormal loss occasioned by the yellow fever. When, however, we take into consideration that whenever, in this and other countries, the fever assumes an aggravated epidemic form, and spreads widely, it takes the place of most other complaints which otherwise would figure in the mortuary list, or, complicating them, imparts to them a fatal tendency, we may reasonably infer that the same results must have obtained at Lisbon; and that while a certain portion of the deaths included in the amount mentioned above—6,857—may not have been the offspring of the prevailing fever, a large number of those supposed by Dr. Guyon to have been produced by intercurrent complaints were in reality due to the other, directly or indirectly.

The conclusion to which Dr. Lyons has arrived relative to the total mortality are somewhat different from those just mentioned. He states that the total recorded number of deaths from the epidemic amounted to 4,753; but remarks that the numbers here given can be accepted only as

an approximation to the true figures ; inasmuch as it is very doubtful whether in any epidemic the method of direct enumeration from hospital and other returns can be supposed capable of giving results free from large error, arising from the difficulty of determining an absolute diagnosis of all cases and the omission of many well-defined instances of the prevalent disease. Deducting from the 13,481 cases reported to the 25th December, 134 as the number of cases wrongfully reported as yellow fever, and adding 1,000 as the probable number of true cases omitted, he arrives at the conclusion that the probable amount of cases reached 14,347. After recalling the fact already mentioned, that the mortality for the year amounted to 11,752, and that the annual mortality being 6,985, the loss of life from the epidemic has been estimated at 4,767—this being the amount above the average—he remarks that this cannot be assumed as the total mortality of the epidemic, and quotes the following conclusion, drawn by Franzini :—

" The average mortality for the four months, September to December inclusive, is only 2,528 ; the mortality in those months of 1857 amounts to 7,874 ; the difference is 5,346, which may be fairly ascribed to the epidemic, and which if we include the burials from yellow fever cases in the British, German, and Jewish cemeteries, may be safely stated at 5,500 for the whole population. This may be taken as the safest approximation to the mortality from the epidemic."

Dr. Lyons adds, that a very constant proportion of deaths to attacks, as 1 to 3, is observable at variable periods of the epidemic, from which Franzini deduces that the total of attacked must have reached from 16,000 to 17,000.

But whatever be the truth in this matter, the mortality which occurred on this occasion was certainly a very large one, and cannot fail to be a subject of sad remembrance to the inhabitants of the Portuguese metropolis. Considerable, however, as it must be admitted to be, Lisbon may yet console herself at having suffered less than other cities on this and the other side of the Atlantic. When we inquire, for example, into the sum of the loss of life in proportion to the entire population and to the number of the sick consequent on some of the epidemics of yellow fever which have visited this city, we shall find a confirmation of this statement. The three sickly seasons of 1793, 1797, and 1798, give us an average of one death in 14.24 of the entire population, and of one in 10.03 of those who remained. The mortality among those attacked, estimating it from the results recorded in each epidemic year, from 1793 downwards, varied from one in 1.2 (1819) to one in 3.86 (1805)—giving an average for all those epidemics of one in 2.12. In other parts of this country the extremes of the ratios has ranged from one in 1.5 to one in 13.1. Excluding the latter epidemics as being exceptional, from the unusual mildness of the disease—the average ratio of all the statements, including those relative to the mortality in public institutions, is one in 2.53—the extremes being one in 1.2 and one in 6. In Spain the disease has occasioned a still greater loss of life. The year 1804 one of great calamity there. On that occasion, twenty-five cities or towns were severely visited by the fever. The population in these amounted to 427,228, of which not less than 52,559, or one in 8.12, perished. In fourteen of those places, at different periods, the mortality in proportion to the population was one in 6.42, the extremes being one in 2.25 and one in 13.3. In seven places, the proportion of persons affected was one in 3.087, the extremes being one in 1.3 and one in 6.42 ; while the hospitals gave a mortality of one in 2.15 of the number admitted, with extremes of one in 1.1 and one in 3.82. The whole number of items noted in the table published by Dr. La Roche, from whose work on the yellow fever the foregoing

statements are borrowed, gives an average of one in 3.55, the extremes being one in 1.1 and one in 9.6.

If we now turn to the results obtained in tropical climates, we shall perceive that, laying aside a few instances when the disease would seem to have assumed an unusually mild character, or to have mostly or exclusively prevailed, as at Boa Vista, among individuals who, from constitutional peculiarities, or the effects of acclimatization, are little liable to the severe forms of fever; or when it has presented itself in a garb calculated to justify doubts as to its genuineness, the mortality there, though sometimes falling short of that experienced at Lisbon, more frequently has exceeded it. Omitting the instances of an exceptional kind referred to, the extremes will be found to range from one in 1.08 to one in 10—the average of all the ratios being one in 2.32. Take, in further illustration, the occurrences at Gorée and St. Louis, Senegal, in 1830. In the former place, 53 Europeans out of the 150 whites constituting the whole of the civil population, died. The cases amounted to no less than 144, being within only six of the entire number of white persons exposed. The deaths, therefore, were in the proportion of one in 2.83 of the population, and one in 2.7 of the sick. In St. Louis, 308 out of 650 died. Scarcely a single individual of the susceptible population escaped an attack. The deaths were in the proportion of one in 2.63 cases, and one in about the same number of inhabitants.

Of the nature of the disease of Lisbon in 1857, little need be said. That it was the true yellow fever there can be no doubt.

Dr. Lyons gives a full, and, as it would seem, a very accurate description of the disease. He remarks that the cases resolved themselves naturally into certain groups, more or less distinguished from each other by the presence or absence of well-marked and characteristic clinical features. This, we scarcely need say, occurs everywhere, and at all epidemic times. Among the groups thus distinguishable from each other, the following were, according to his observations, perhaps those best marked, and most readily recognizable: 1st. The Algid Form. 2d. The Sthenic Form. 3d. The Hemorrhagic Form. 4th. The Purpuric Form. 5th. The Typhous Form.

It will be unnecessary to follow Dr. Lyons in a detailed account of the disease, under these several heads, which embrace all the cases of it which present themselves, in greater or less number, in times of wide extended epidemics. We have only room for a few general remarks. Dr. Lyons states that, regarding the epidemic in question in a general way, with a view to the determination of its leading nosological features, it presented all the characters of a well-marked fever. The nervous system was oppressed, the circulation highly excited, while the secretions were diminished in quantity, altered, or suppressed. The temperature was elevated, the skin hot and dry to the touch, and the thermometer in the axillæ indicated an increase above the natural standard, frequently to the extent of two, four, and sometimes six degrees Fahrenheit.

The sensorial functions were but comparatively little affected on the whole, and it was common for patients to retain possession of their faculties till shortly before death. Exceptions, however, occurred to this rule, and cerebral excitement, with delirium, and other head symptoms, were observed in a certain number of cases. It was difficult, Dr. L. continues, to reduce the disease to any distinct type of febrile action; strictly speaking, it did not correspond to any of the regular types of continued, intermittent, or remittent fever; the phenomena were, undoubtedly, perfectly continuous in numerous cases, for days together. Intervals also occurred in which the

patient was devoid of pyrexial excitement of any kind, but these intervals were irregular in their periods of occurrence, and not by any means constant, and they were certainly wanting in any definite character of periodicity. In his judgment, the disease is best described as a fever composed of distinct stages or periods, the characters and the order of occurrence of which, though by no means constant and uniform, observed much regularity in the majority of cases.

At Lisbon, the most commonly prevalent form was the algid. Next came, in point of frequency, the hemorrhagic; next again, the sthenic, while the purpuric occurred in a limited number of cases, and the typhous only occasionally. The algid form was, as its equivalent is elsewhere, generally speaking, that which presented the most rapid course, the earliest and greatest amount of prostration of the vital powers, and which, likewise, offered in most frequent combination the most appalling characters of the epidemic re-united in individual cases. Dr. Lyons well observes there can be no doubt—

"That a great deal of the discrepancy of statement and conflict of opinion in the accounts we possess of the several epidemics of yellow fever, occurring in various localities, has arisen from the different forms which the disease presents being confounded in one common description, embracing the phenomena of all. It will, I think, be pretty evident that the description of an epidemic, on which the form I shall describe as the algid form predominated, must differ essentially from that of an epidemic in which the sthenic, the hemorrhagic, or the purpuric varieties were most generally presented. The same holds with respect to the typhoid form, which, though not a prevailing type in the Lisbon epidemic, must, when presented largely in any visitation of yellow fever, give a special character to it."

Dr. Guyon, though not offering an elaborate description of the disease, calls attention to some points relative to which it varied more or less from the cases noticed somewhat frequently in this and other countries, not only during different periods of the same epidemic, but during different sickly seasons. Generally speaking, there was an absence, or less intenseness, during the first stage, of headache, and pain in the loins and limbs. The febrile symptoms were moderate. Indeed, many of the patients felt so slightly indisposed, as to be able to walk without assistance to an hospital. But whatever may have been the aspect of the disease, during the first stage, its characteristic features did not fail to manifest themselves at a subsequent period; while the diagnosis was confirmed by the post-mortem examination of those who perished. In relation to this point Dr. Lyons makes the following statement:—

"I am not aware of the occurrence during any portion of the Lisbon epidemic of 1857, of that class of rapidly fatal cases, vernacularly known elsewhere as 'walking cases,' and though rachialgia was a common symptom, I did not observe nor hear of its occurrence in that intense form accompanied with sudden prostration of the vital powers, and rapidly fatal issue, known so constantly in the older epidemics, as 'coup de barre,' or stroke of the bar, from the suddenness and violence of the attack of pain in the back or loins, and the 'knock-down' influence of the disease upon the patients from the first moment of invasion."

We must not neglect to mention that similarly to what has not unfrequently occurred elsewhere, and perhaps more particularly during the last few years, the black vomit at Lisbon did not prove as invariably fatal in 1857, as it appears to have done in 1723, and, indeed, as it has been wont to do in many places, and during the greater number of epidemics. So far from this being the case, a number of recoveries occurred after a free

discharge of this dreaded matter from the stomach of both male and female patients.

Nothing satisfactory relative to the pathological anatomy of the disease can be gathered from the work of Dr. Guyon. We learn from it, however, that this important subject is far from having been neglected by the Lisbon physicians, and we may expect to receive, before long, the results of their researches. In the meanwhile, we may state as a fact worthy of the special notice of all American physicians, and for a knowledge of which we are indebted to a recent French writer,¹ that the dissections performed at Lisbon, revealed the existence of the fatty degeneration of the liver, a pathological condition first pointed out, so far as the yellow fever is concerned, by our distinguished countryman, Professor Clark, of New York.

But while Dr. Guyon has remained comparatively silent on the morbid changes left in the tissues and organs by the disease under consideration; and we know as yet little or nothing of the researches of the native physicians; Dr. Lyons's excellent report presents us with a most valuable record of his ample investigations in the matter. Nowhere, indeed, shall we find a more minute and comprehensive account of the pathological anatomy of the disease. It embraces a detail of the lesions occurring in the several tissues and organs implicated, primarily or secondarily, in the complaint—in their solids as well as in their fluids. We have not the space required to enable us to follow Dr. Lyons in these details, and to do full justice to his statements on the subjects involved in the inquiry. Nor, indeed, do we deem it necessary to enlarge on the subject, even were it in our power to do so without inconvenience, inasmuch as the lesions recorded in the work before us are, for the most part, similar to those noticed elsewhere in the same disease, and rather confirm what has been noticed by other investigators, than indicate the existence of pathological characters before unknown. On one point only shall we dwell somewhat at large, *i. e.*, the condition of the liver.

Dr. Lyons states that the most remarkable, the most constant, and, to his mind, the most inexplicable condition presented in the *post-mortem* examination of fatal yellow fever cases, was the state of that organ. He believes it may be affirmed that *some* departure from its normal state was an absolutely constant condition in all the cases which proved fatal. In relation to colour, firmness, consistence, dryness, the organ presented the characters recognized by all morbid anatomists, especially since the researches of Louis in the Gibraltar epidemic of 1828; while the microscopic examination of the hepatic tissue, which Dr. Lyons instituted, fully confirmed the results obtained by Dr. Clark, and subsequent pathological anatomists in this country.

"The fawn-yellow coloration," Dr. L. remarks, "usually well indicated the change that had taken place in the hepatic tissue; but it was not only in those cases in which the liver presented this coloration that abnormal states of the hepatic structure existed. The yellowish-brown colour, 'chocolat au lait,' was attended with similar, and fully as well-marked changes. The same may be said of the nutmeg condition of the organ, and even to some extent of several cases in which the ordinary liver-brown colour was unchanged."

"Minute fine sections (by Valentin's double knife), or matter scraped from the hepatic texture, exhibited the hepatic cells filled with globular oily and fatty matter. The natural appearance of the cell was completely altered, its outlines obscured, and its nucleus rendered invisible. It was surcharged with molecular and globular oily matter, while the whole field, and the interspaces

¹ Dutraulau, Topographie Médicale des Climats Intertropicaux, p. 98, foot-note.

between the cells, were filled with similar and equally abundant oily and fatty elements. When carefully treated with ether, its oily and fatty elements were in part dissipated, and the contour of the cells brought more clearly into view, but it was only rarely that the nucleus could, even by long treatment in ether, be made visible.

"It was sufficiently obvious from these investigations, that the marked character of the hepatic lesion was that of fatty degeneration, with accumulations of fatty elements in the otherwise normal hepatic cells."

Feeling convinced that researches with the microscope, however carefully made, gave but imperfect and unsatisfactory determinations of the positive and comparative amount of fatty deposit in the hepatic tissue, Dr. Lyons determined to estimate the specific gravity of the organ in a good many cases, with a view to a more accurate appreciation of the amount of change thus induced; it being of course fairly presumable, as he thought, that in proportion of the amount of fatty accumulation in the hepatic structure the specific gravity of the organ would be found diminished accordingly.

"The general results were uniformly found to bear out this presumption. It was ascertained that in general the fawn-yellow colour of the liver corresponded with abundant granular and molecular fatty matter in the hepatic cells, as shown by microscopic examination, and with diminished specific gravity of the liver substance, as shown" "by the areometer of Beaumé. The results thus obtained were further confirmed by the determination of the absolute quantity of ethereous extract in given weights of hepatic substance in different cases."

"The mode of procedure was as follows: A very strong solution of common salt¹ was made in a glass vessel of suitable height. The areometer of Beaumé was allowed to float freely in this vessel. Small cubes of hepatic substance were cut from the central parts of the liver, and immersed in the fluid; if they sank an additional quantity of salt was carefully added; if they floated high upon the surface, water was gently poured into the solution. In either case, the precise moment was carefully observed when the cube of hepatic substance, after having assumed a position between floating and sinking, and having oscillated slightly up and down, seemed for an instant or two to be in equilibrium; the degree marked upon the areometer was then recorded as accurately as possible. But as the instrument marked only whole degrees, the readings of fractional parts of a degree could not be taken with all the accuracy desirable. In recording the observations, care was taken to allow the error of sight to be on the side of the greater rather than the less specific gravity."

Dr. Lyons next proceeded to determine the absolute quantity of fatty matter in the liver by maceration in sulphuric ether and subsequent evaporation. The results were generally conformable to what was already stated. They prove that with the yellow or buff-coloured, or even the chocolate-coloured state of the hepatic substance in the cases examined, there was found a considerable quantity of that matter, and that, in some instances, a very marked increase of the fatty element was determined. It has already been shown that at the microscope and the areometer a corresponding result was obtained.

Some examinations, both qualitative and quantitative, were made to determine the state of the saccharine function of the liver. The following general results were obtained:—

"In cases fatal within the first period of the disease, the hepatic tissue gave the characteristic saccharine reaction with the Barreswil fluid, cupro-potassic solution. In cases of longer standing, which had passed into the second or third period, the reaction with the Barreswil solution was extremely faint, and in some instances was altogether absent."

¹ This, though not the most suitable agent for estimating the specific gravity of animal tissues, was the only one readily available.

In some instances Dr. Lyons obtained slight but appreciable reaction with the liquor potassæ test, with the production of a faint but characteristic odour of caramel.

Similarly also to what has usually been observed in most places and in the greater number of epidemics, the fever, though not sparing any classes of individuals, manifested a special preference for persons of a strong and plethoric constitution and enjoying robust health. It occurred more generally and was more fatal among males than females, as well as among individuals in the prime of life; while it spared, comparatively at least, young children, old people, and valetudinarians. All this is conformable to what was observed in the same city in 1723, and has almost invariably occurred elsewhere. The state of marriage exercised an influence on the mortality. Of 3,486 unmarried persons 1,123 died, or 32.21 per cent. Amongst 1,099 married persons 498, or 45.31 per cent. died; and of 503 widowed (276 females), 263, or 52.43 per cent. died.

Of 1,192 vaccinated patients 351 died, or 29.44 per cent.; and of 2,308 non-vaccinated 894 died, or 38.73 per cent. Of 2,087 who had had variola 635, or 30.42 per cent. died; and of 1,279 who had not had variola 556, or 43.54 per cent. Unlike what appears to have happened during the last-mentioned epidemic when, as we are informed on the authority of Sanchez, the black race was completely spared, a goodly number of persons of that colour were attacked with the disease in 1857. This liability of negroes to the fever, though contrasting with the results observed in former times at Lisbon and in most other places, from the earliest records of the disease, cannot be regarded, at present particularly, as a subject of surprise, inasmuch as, independently of the circumstance that in extra-tropical climates, where natives or long residents are never secure unless through the effect of an attack, individuals of the black race, though suffering in a less proportion and with less fatality than whites, have seldom been found to pass unscathed through an epidemic of considerable violence. It has not unfrequently happened, indeed, that they have furnished no inconsiderable quota to the list of cases and deaths, even in places where they had heretofore been regarded as perfectly secure.

The disease spread widely and fatally among the upper classes of society, contrasting in this respect with what had taken place the year before in the same city in regard to the Asiatic cholera, which caused a mortality of more than 4,500 persons, principally, if not wholly, among the lower classes. Hence, while the latter disease received from the inhabitants the epithet of democratic, the yellow fever was held up as being aristocratic in its tendencies.

In the worst quarters of the city the mortality was 42 and 43 per cent., the mean mortality being about 33 per cent. The mean duration of the sojourn in hospital was 6 days; for those cured it was 8 days; a little longer for women than for men. In fatal cases the mean duration was 4 days; for men a little more.

The number of physicians and surgeons practising at Lisbon and its dependencies at the time of the epidemic amounted to near 240. Of these, according to one report, 14 died, or 1 in 17.14; and according to another 18, or 1 in 13.34. This loss, though heavy, is small in comparison with that often experienced elsewhere. In this city, where the physicians were not, any more than they could be at Lisbon, acclimatized to the disease, the mortality among them during some of our epidemics was much more considerable.

In 1793 the number of physicians, regular and irregular, enumerated in the

Directory as residing not only in the city, but in Southwark and the Northern Liberties, was 61. In 1797 it amounted to 68, and the next year to 75. In the first of these years, exclusive of medical students, no less than 10 physicians were swept off by the fever in little more than a month. We are further told that hardly one of those that survived or remained in the city escaped an attack. This gives us a proportion of about 1 in 6 of the whole number. In 1797, 9 fell victims to the disease, while of the survivors 8 were affected more or less severely. This gives a proportion of 1 death in 7.55, and 1 case in 4. New York, in 1798, lost 11 of her physicians out of probably some 30 or 40, of which the medical corps was then composed. The same year Philadelphia, more fortunate than she had been on preceding occasions, lost but 3, besides 2 medical students, or 1 in 25 of the whole number.

It must be remembered that while the number of physicians in the city and districts was such as mentioned, the actual number exposed to the disease was much more limited. We are told by Dr. Rush that at one period of the epidemic of 1793 there was a great deficiency of physicians, from the desertion of some and the sickness and death of others, and that at one time there were but three physicians who were able to do business out of their houses. To this may be added that many lived and practised at a distance from the infected districts, and probably never approached the sick. In 1797, as we again learn from Dr. Rush, the disease bore, not on 68 physicians, the number registered in the Directory, but on only three or four and twenty, this being the full amount of those who attended patients in the disease. The others had probably deserted; or kept aloof from the scene of infection.

In 1798 this city could boast, at the time of the epidemic, of only 28 physicians doing duty among the sick. The loss, therefore, comparatively limited as it was, gives a larger percentage than was noticed at Lisbon. At Martinique, in 1821, of 15 unacclimatized and unsecured physicians 10 perished. Four years after the loss was still greater; for 3 out of 4 doing duty among the troops fell victims to the disease. In Senegal, in 1830, all the navy surgeons suffered to a greater or less extent, and 6 out of 12 died.

The apothecaries suffered more extensively at Lisbon than the physicians. They numbered only 135, and yet sustained a loss of 13, or 1 in about 10.4. Their proportional loss was therefore nearly double that of the physicians; for had their number equalled that of the latter, the deaths among them would, in the same ratio, have reached 23.11.

The fever, as is usual in extra-tropical climates, commenced and was most prevalent in the lower parts of the city, and produced, as we have seen, its greatest ravages in those localities specified, and the streets particularly remarkable, for the abominations referred to. Spreading at first along the borders of the river at each side of the spot where it broke out, it subsequently extended to the upper parts of the city. Though passing, as it were, gradually from house to house, it often left, in its onward course, one or more intermediary buildings free from its presence. The same may be said of its mode of progression from street to street, as also from district to district. In other words, it respected one or more streets and districts situated between those attacked. In none of these instances was it possible to explain the cause of this exemption; the houses, streets, and districts which remained free from the infection presenting the same hygienic conditions and being placed under the same atmospheric influences as those in the vicinity. Several public institutions—the poor-house, the orphan and insane asylums,

the gas-works, &c.—though located in infected quarters, remained free from the epidemic visitation.

The disease, when it once broke out in a house, seldom failed to attack several of the inmates. As many as 14 and 18 persons were seized by it in a single domicile. When once a house became the seat of infection, it was rendered by the fact a focus of reproduction of the disease. It was dangerous to visit, and especially to lodge in it, whether or not it contained persons affected with the disease. The danger was especially great at night. In several instances it was observed that infected houses could be visited or resided in during the day with perfect impunity, while individuals who remained there at night were almost sure to suffer. The same danger from night exposure was exemplified in the city at large, after the disease had assumed a firm footing in it and become general. Persons who, residing in the country, came to town during the daytime, and returned home in the evening, seldom were affected. In this respect the yellow fever of Lisbon bore the closest analogy to the disease as it shows itself in this and other countries, in relation to which the danger of night exposure has invariably been signalized. Well, indeed, may it be said that on no subject connected with the etiology of the yellow fever are writers more unanimous than in attributing to night-air in an infected district a more baneful influence than to that of day. Of the large number of such writers, scarcely one can be found unprepared to admit that exposure to such districts by night is almost sure to be followed by an attack.

In another respect the disease presented a phenomenon similar to that observed, if not always, at least frequently, in this country and elsewhere—its inability to spread beyond the circumscribed sphere of the infection. Developed within the limits of the city, it was not conveyed by emigrants who had been exposed to the influence of the poison, or by the sick, to the environs or to the interior parts of the kingdom, although many of the former sickened and some died after their removal, or left the city already labouring under the premonitory symptoms of the fever. Such occurrences, common enough, as we all know, everywhere, had already been observed in Lisbon ; for we learn from a statement by Kennedy and Leitão, relative to the epidemic of 1723, that the high parts of the city were much freer than the lower parts, and that the villages and country houses of the vicinity were entirely exempt from the distemper, notwithstanding the utmost communication was kept up between them all the time. Da Cunha makes similar statements as regards the localities most affected, adding that "it was only in the unclean places that there was this multitude of diseases." Of the epidemic of 1724 kindred remarks are made by José Pinheiro de Freitas Soares.¹ "It was thought to have its origin in the corruption of the air by reason of the dirtiness of the streets, because the epidemic attacked chiefly the families that lived in the lowest parts of the city, where the streets were very narrow and dirty, and in the higher places it was only a few families that were attacked."

Dr. Lyons notes the immunity enjoyed by the shipping in the Tagus, notwithstanding the great and most constant intercourse with the town. He knows of but one instance of a British seaman (master of a brig) having become a victim to the disease. The individual in question had been drinking on shore.

As is usually the case in extra-tropical regions, and as was observed in 1723, the epidemic of 1857 broke out after, and continued to spread at first during, the prevalence of very hot weather. A hot, humid atmosphere

¹ *Polícia Medeça*, 1818, p. 349.

tended to increase its extension and virulence. The pressure of the atmosphere exercised an equal influence upon it in both respects. It increased with the depression of the barometer, while a change for the better was observed as the pressure diminished. But although the fever appeared under the influence of high atmospheric heat, it continued to prevail, more or less extensively, after the temperature had greatly lowered. On the 1st of December, some seven or eight weeks prior to the final cessation of the epidemic, the thermometer marked $13^{\circ}.6$ of Cent. ($56^{\circ}.4$ of Fahr.), and on the 31st 7° ($44^{\circ}.6$ Fahr.),¹ and yet cases occurred, though in diminished number, for some weeks after. Kindred results had already been noticed at Lisbon in 1723, and are referred to by Dr. Kennedy, who, in the letter several times quoted, mentions that the weather had changed several times to rain and cold during the course of the epidemic, without any abatement in the distemper. It may, however, be presumed that these changes, though sufficiently marked to be noticed, were not so great as to bring the thermometer down to the freezing point, an event which at the close of October never occurs at Lisbon. To those of our readers who have devoted some attention to the history of the disease, the fact just mentioned will not be a matter of astonishment, for this continued occurrence of cases, after a change of temperature has taken place, is frequently noticed. Thus, to speak only of the events in this country, it is a well-known fact that when our cities are visited epidemically with the yellow fever, the disease is not always particularly rife during the hottest months of the season, but some time after, when the average temperature has lowered in a notable degree; and that, so far from its diminishing as the weather becomes cooler, cases are often multiplied daily till the temperature reaches the freezing point, when the occurrence of new cases ceases at once. Take the epidemic of 1793 in this city as an example. The deaths in August, when the mean temperature at mid-day was $82^{\circ}.55$ ($69^{\circ}.03$ in the morning), amounted to 325; in September, with a mean heat of $76^{\circ}.48$ ($60^{\circ}.93$ in the morning), the mortality reached 1,442; and in October, with a temperature of only $62^{\circ}.57$ ($44^{\circ}.06$ in the morning), the deaths fell but little short of 2,000.

Cool weather, therefore, when the disease is fairly established, so far from diminishing its extension, sometimes increases it. These facts have been noticed not only here, but in our Southern States also, as well as at Barcelona in 1821, and in tropical climates.

While the yellow fever thus prevailed in Lisbon, and was exercising there its usual ravages, the country around was sorely afflicted with malarial fevers of the remittent and intermittent types. They extended their sway to the very gates of the city, and prevailed in all the localities situated along the Tagus, as far as Santarem. These fevers are of annual occurrence, in the same season, in these localities, but were uncommonly rife in 1857, in consequence of the large number of men collected there for the completion of the railroad connecting Lisbon with Santarem.

We do not find that anything of importance was done in relation to the treatment of the disease. At an early period of the epidemic many of the physicians resorted to the lancet, but the results were not such as to encourage them in persevering in the practice. It was, therefore, finally abandoned. More success appears to have been obtained from the use of stimulants, counter-irritants, purgatives, and the employment of special remedies, such as bark, iron, and more especially quinia. The majority of physicians, though differing relative to the precise time at which quinia

¹ If the $13^{\circ}.7$ and 7° indicate degrees in the scale of Reaumur, the equivalents in that of Fahrenheit are $62^{\circ}.6$ and $47^{\circ}.75$.

should be administered, thought highly of its effects. Dr. Lyons, in speaking of the remedy, says it was used both by the mouth and anus. Given by the mouth, it was prescribed in large doses; and in small doses it was used at the outset of the disease, and in all stages to the last. In the form of enema he saw it administered to the extent of seventy-two grains, divided into four clysters, one of which was given every sixth hour. From his experience of quinia, as administered in the epidemic, he is far from being disposed to regard it as a drug upon which any reliance can be placed when exhibited during the course of the disease. He is of opinion that the indications for its use as an antiperiodic are not very clearly manifested, and that its tonic action is too slow in a class of cases in which prompt support to the system and immediate stimulation are often so urgently called for. It would appear, however, from what Dr. Guyon observed while in Lisbon, that the remedy was found more useful when employed at the period of remission usually occurring in the morning during the first stage of the attack, than during the metaprosis, or that moment of calm constituting the link between the first and second stages of the disease, and which some pathologists wrongfully regard in the light of a true remission. It may be presumed, from what is here said of morning remissions during the first stage, and the benefit derived from this antiperiodic when administered at these periods, that the disease was generally modified through the influence of the paludal poison, which, as we have seen, was rife at the time, and must have penetrated, to a greater or less extent, to the very heart of the city.

Dr. Lyons informs us that the perchloride of iron was employed as an internal remedy, in doses of from three to six grains, two, three, four, or more times in the day, and, in some cases at least, with apparently good results, in arresting the hemorrhagic tendency. Chromic acid, in similar doses, was also used internally with the same view, but, as he thinks, with less advantage than the iron.

Dr. Guyon furnishes us no satisfactory information upon which to base an opinion respecting the probable origin of the fever and its mode of propagation. He himself hazards no conclusion, and postpones to some future time the publication of the facts he has collected on the subject. It would be unsafe, therefore, could we appeal to no other authority than his own, to arrive at a decision on the important points in question. Much to our gratification, Dr. Lyons has been less disposed to withhold the opinion he has formed on the subject. More particularly pleased are we to find that the occurrences in Lisbon go far to confirm us in the views we have long entertained respecting the local origin and non-contagious character of the yellow fever.

Dr. Lyons remarks that, from the first invasion of the epidemic, a belief became wide-spread and general, that the disease had been imported. This opinion was shared alike by persons in all ranks of society, by many amongst the educated, as well as the illiterate, and by many highly respectable members of the medical faculty, as well as by the public at large. It was not, however, universally accepted, for both in the faculty of medicine, and from several non-professional persons of great intelligence, the most distinct avowals of a belief in the entirely local origin of the epidemic were made, while certain existing conditions were pointed out, manifestly sufficient to account for its causation. As an impartial investigator, Dr. Lyons considered it to be his duty to inquire very fully into such evidence as was adduced in support of both sides of this important question. On this subject he remarks:—

"After a most careful inquiry amongst various official persons, and in quarters in which reliable evidence could be expected on such matters, I am obliged to state that in no one instance did I obtain such a consistent assemblage of facts, or such an array of well-supported allegations, as would, in my mind, warrant the conclusion that the importation theory was even moderately well founded. On the contrary, so vague, and in some essential particulars, so conflicting were the allegations as to the time, place, and other circumstances attending the reputed importation of the disease, that I do not believe that the popular opinion so generally held as to the importation of the epidemic admits of being reduced to anything like a uniform or consistent statement in writing.

"Of the reports in circulation as to the alleged importation, the two most generally received were, firstly, that the disease was communicated to persons in the custom-house, engaged in the examination of the baggage and personal effects of passengers arriving from the Brazils; secondly, that the manner of importation was by certain cargoes of hides from the Brazils. In connection with the first report, it is to be observed that there was no uniformity in the accounts given by different persons of the circumstances of time and place under which the importation was alleged to have occurred. There was no concurrence of testimony as to the particular ship, the date of her arrival, the port she sailed from, or the health of the passengers she brought. By one set of persons the ship specified was the Brazilian mail steamer Tamar; by others, a different ship was particularized with equal confidence.

"In one account of the importation of the disease, in connection with hides from the Brazils, it was stated that the hides were landed at the custom-house; in another, that the hides were landed at a certain wharf higher up the river. After the most careful inquiry in all quarters, I am unable to produce any more circumstantial account of the alleged importation of the malady than is contained in the foregoing statement.

"The considerable number of attacks and deaths which took place in the custom-house, and in the adjacent parts of the city, was constantly adduced in proof of the origin of the epidemic in the custom-house, and its propagation from that establishment as a centre." No such argument, however, "is supported by the facts. The undoubted frequency of the attacks, and the mortality in the quarter in question, were equalled and surpassed in districts considerably removed from proximity to the river."

But besides all this, many things—nearly all of which are adduced by Dr. Lyons—point to the conclusion that the epidemic in question was of local origin, and devoid of contagious properties. In the first place, we may remark that the epidemic which broke out at Lisbon in 1723, and carried off, as we have seen, 6000 persons, was never shown to have been introduced into that city from abroad. Nor was it held, at the time, by those competent to decide, as being propagated by contagion. We have seen that, according to Leitão, there were "most deaths where most dirt," when vapours arose by reason of heat, and the winds which prevailed were from the west. We have seen, too, that Soares says of the fever of 1724, that it was thought to have its origin in the corruption of the air, by reason of the dirtiness of the streets. Writing a few years later of what he had noticed on the memorable occasion of the epidemic of 1723, Da Cunha says: "What I always said, and which I persist in, is that diseases were not contagious, and they were all choleric diseases, caused by the heating and exalting of the cholera (bile), all occasioned by the inclemency of the weather." He admits that others were not of his opinion, and that various objections were raised to his views. But he adhered to these, and upheld the doctrine of local origin and non-contagion, by reasonings and a display of facts that would do no discredit to a modern infectionist, while his antagonists contented themselves with stringing together unsupported assertions, and could never point out the source of the alleged importation,

or a proof of transmission from the sick to the well. In this connection, the following passage is interesting.

"I remember that, being physician in Alfizerão and St. Martin, there was a lake between the two districts, which, when the summer came on, dried up, and part of which remained putrefied, and the winds coming, carried the vapours to both districts; and there were so many diseases, that scarcely one person escaped without falling sick, having myself 125 persons sick, and almost all with malignant diseases; many had parotitis and pinta. The winter coming on, the lake was inundated again, and all the diseases vanished; and the following year the lake opening itself, and what remained being burned, there were no more similar diseases."

In another place, after stating that it was only in the unclean localities that this multitude of cases occurred, he says: "The sun causing the more subtle particles to rise in vapours, which entering into the houses were introduced into the body, which was prepared to receive them by the rarefaction of its pores."

We are not unmindful of the fact that the epidemic in question was said by Sir Gilbert Blane to have been the result of importation from Brazil. But the mere assertion of that writer cannot be admitted as sufficient to establish the fact, inasmuch as he does not state where and from whom he obtained the information; and writing as he did, a full century after the event, he could not know much about it himself. A little reflection might perhaps have led him to refrain from making the statement, for the fever did not prevail in Brazil at the time, and could not very well be carried thence across the ocean. But importationists and contagionists of pure water, as Blane was, and as many others we could name are, have an easy way of getting over difficulties of the sort; and when we recollect that the epidemic of Cadiz, in 1819, was by some, otherwise clever men, traced in a way satisfactory to them, to a vessel which some months previously had arrived from Calcutta, where, as is well known, the yellow fever never shows itself; when we bear in mind that, to meet an objection raised against that theory, and founded on the invariable absence of the disease, at its supposed source of origin, it was contended that the Asiatic cholera, which *was* prevailing there at the time, might well be supposed to have been transformed by change of climate into the yellow fever; when, besides, we are gravely told that the epidemic of Agamont, in Spain, owed its origin to a piece of cheese which some fishermen had procured at sea from an English vessel of war on her passage from Gibraltar to England, which vessel they did not board, contained no sick, and did not communicate the fever at the port where she arrived; when we recollect these things, we say, we must be prepared for any statements by which physicians of the category mentioned may uphold their favourite theories. Let it be remarked, that nothing has been said of the foreign origin of the fever of Ericeira, in 1721; of Lisbon, in 1724; of Peniche, in 1728, and of Funchal, in 1738. Again, let it be remarked, that if the epidemic of 1857 is to be attributed to importation from abroad, the same explanation must be given relative to the fever which broke out, not only at Lisbon, but at Belem also, in 1856. Now, how did matters stand, in relation to that epidemic?

Of 311 cases recorded to have occurred in Lisbon in 1856, somewhat more than two-thirds were observed in districts far removed from the river margin. The three districts attacked in 1856, Belem, St. Roque, and Los Anjos (Bica) are widely separated from each other, and present no recognizable connection, commercial or otherwise, among themselves, nor with

the exterior by way of sea traffic. These districts are likewise on different elevations.

Let it be remarked, too, that the yellow fever of Oporto, in 1856, is attributed by Dr. Gonveia of that city to the filth of the quarter Miragaia, in which the disease prevailed, and not to importation ; and no one has yet been able to disprove that opinion.

Nothing in all this looks as in any way favouring the opinion of the disease being of foreign origin. Add to it that, so far, no fact has been adduced likely to justify, in the most remote degree, a belief in this origin. No vessel or individual has been pointed out with any show of probability as being the agent of introduction of the disease. Are we not at liberty to say that until those several visitations are shown to have been the result of an imported infectious poison, the more violent and disastrous epidemic of 1857 may well be considered as being produced by local causes ? Dr. Lyons calls attention to the fact that while there is no uniform testimony as to the time, place, and other circumstances of the alleged importation of the epidemic in 1856 and 1857, it is certain that no case of the disease was received into the lazaretto in either of those years, or in any recent year. (The Inspector of this place, who has resided there forty-two years, affirmed in the most positive manner that there has never been one single person of those undergoing quarantine who was attacked with an epidemic disease.) The fact of the fever not being communicated out of the city by emigrants in health, or by those who afterwards sickened and died in the country, certainly does not indicate the existence of contagion. On this subject the statements of Dr. Lyons are positive.

"The freest communication was kept up, even during the height of the epidemic, between Lisbon and Cintra, and many other favourite places of resort, to which the citizens retired in great numbers; yet no cases can be adduced to show that the disease spread or was carried by contagion or otherwise from Lisbon to such localities. Cintra was perhaps the place most frequented, and with which much free daily communication was consequently kept up; but I could obtain no reliable evidence that one single case of genuine yellow fever occurred in that town. I have heard statements," Dr. L. continues, "to the effect that the disease was propagated by contagion to some minor towns, but I have seen no evidence, documentary or otherwise, to prove the truth of such allegations, or render them even probable. On the contrary, the uniform testimony of popular report (so far as it is at all reliable or worth noticing) went to show that the disease was not propagated beyond the walls of Lisbon."

As already mentioned, no restriction seems to have been imposed to the intercourse between the shipping on the Tagus and the inhabitants of various parts of the city, or between the sick and well, wherever the former might be; and again, as we have seen, the inmates of many houses, though in close proximity to others containing persons labouring under the disease, and doubtless visiting these, remained free from its attacks throughout the whole duration of the calamity. The inhabitants of certain healthy streets or quarters of the city, although visited daily by individuals who had been exposed, by residence or otherwise, to the poison in infected localities, and whose clothes may well be supposed to have been impregnated with such poison—although themselves mixing, for traffic or otherwise, with the population of the sickly parts, remained free from the disease, or if they took it there, did not communicate it to their families, attendants, or visitors.

It is not customary for apothecaries to mix much with the sick. They, as a general rule, remain in their shops. While they do this, physicians, as a necessary consequence of the nature of the duties they are called upon to perform, approach and touch the sick, and are in every possible way exposed

to the baneful influence of contagious poisons, when such poisons exist. Nevertheless, as we have seen, apothecaries suffered in a far greater proportion than physicians. It may be remarked, in corroboration, that a class of females who, from their frequent and close personal intercourse with strangers and individuals exposed to and carrying about them the contagious poison—we allude to prostitutes—were scarcely touched by the disease. They numbered 600 at the time of the epidemic. Of these only 5 or 6 died, or 1 in 60. In addition, attention may be called to a fact already adverted to, that individuals from uninfected spots, or from the country, who visited less favoured localities, escaped the disease, provided they retired to their places of abode before night. They might enter and perambulate the city, for business or otherwise; they might step from their healthy streets and districts to those in which the fever raged with violence, and enter and remain for hours in houses actually occupied by the sick, or where deaths in greater or less number had but recently occurred; they might, indeed, visit the very chamber of the sick and dying; but they must do so before nightfall. At a later hour such exposures became dangerous, and those who slept all night in such places were almost sure to be seized with the disease.

It may not be improper to add, to all that has already been said, that instances of immunity from the so-called contagion were long ago observed at Lisbon. Kennedy states that at the time of his writing—31st of October, 1723—two months and a half after the outbreak of the fever, the latter had not yet entered any convent except the Irish, although the inmates of all those establishments never intermitted their attendance on the sick. We must also remind the reader that the same physician stated that during this epidemic of 1723 the villages and country-houses about town were entirely free from the disease, “notwithstanding the great communication.”

The reader must bear in mind that all the parts of the city largely attacked by the epidemic present in common certain conditions of insalubrity, which have been described in detail in an early part of this article; nor must we omit to mention that the state of the shore of the Tagus, for fully one-half of the extent of the city along the river-side, is such as to be a highly effective cause of insalubrity, not only to the adjacent districts, but to the whole capital. The vast area of extremely fetid decomposing mud left exposed at low water exhales noxious gases very prejudicial to health.

While in the epidemic of 1856 two out of the three localities chiefly attacked—St. Roque and Bica—were at some distance from the river, in 1857 the largest number of cases occurred in the first instance in the proximity of the custom-house, and in that establishment itself.

“No case,” says Dr. Lyons, “is recorded in this locality prior to September, 1857; but before this date there seems good ground for believing that cases of undoubted yellow fever had been observed. One case is recorded as having been verified so early as May, 1857. Another case is stated to have been seen in July, while there appear to have been at least five in August. Some of these cases occurred in the quarter St. Roque, an elevated district, 100 to 150 feet above the Tagus level.” “It has been attempted to give a special significance to certain of these cases, by saying that the parties attacked, though residents in the district of St. Roque, were employed in the custom-house. I can neither affirm nor positively deny the truth of the statement, as I could procure no reliable evidence respecting it, and I am not aware that any such exists. My own conviction, based on the results of inquiries made amongst medical men of all shades of opinion, is, that prior to the declared and fully recognized existence of the epidemic, isolated cases presented themselves in various parts of the city, of which no accurate record was made, but of the existence of which no moral doubt can be entertained.”

In conclusion, it may be remarked that although public opinion was strongly in favour of the importation theory, little if any apprehension of personal contagion was entertained by those in attendance upon and in daily contact with the sick. This indifference to exposure to the supposed contagion of the fever was observable in all classes of society, amongst the lowest as well as the highest. A large number of the inhabitants, it is true, sought safety by flight from the focus of the infection; but amongst the population which remained, "humanity was spared those humiliating and appalling scenes which the medical historian tells us were so constantly presented in the epidemics of the middle ages, of the sick and dying abandoned by their nearest relatives and friends."

R. La R.

ART. XVI.—*Chemistry, in its Relations to Physiology and Medicine.*

By GEORGE E. DAY, M. A., Cantab., M. D., F. R. S., Professor of Medicine in the University of St. Andrew's. London : H. Baillière, 1860. 8vo. pp. 518.

THE department of science to which the treatise before us relates has, through the labours of its numerous cultivators, become so intimately connected with rational practical medicine as to exercise a very material influence upon the views of those physicians who act in accordance with facts rather than fancies, and, as a consequence, has modified to a considerable extent the practical application of medical principles.

We need not stop now to discuss the opinion above enunciated, as it will, we think, be sufficiently established by what we have to say in detail of Dr. Day's volume; and yet we can scarcely refrain from calling to mind how the students of physiological chemistry have been reviled; how they have had to contend with many of those who, from their eminence and ability, should have opened their minds to the light of truth, but who, alas! have wilfully or ignorantly closed them against the mild persuasions of science. We cannot forget how many prejudices have been called into action against those who brought to the investigation of nature's laws the rigid tests of experimental analysis, and how even the sacred influence of religion was sought to be hurled against those who presumed to employ the principles of chemistry in their inquiries concerning the functional actions of the organism. We do not forget these things, and, remembering them, we find the greater cause for congratulation that, in spite of those obstacles which since the inauguration of the freedom of thought have always been opposed to the progress of truth, the science of physiological chemistry has steadily, though slowly, advanced till it has attained a recognized position among the sciences developed by the reason and the labour of man. True, there are still some who refuse to receive its teachings; there are still some who prefer the vague theories of the past to the facts of the present; but their name is *not* legion, and their voice is *not* mighty, and they grope confusedly in the darkness they love so well, vestiges of an age which, we trust, has passed away forever.

The treatise which we propose to bring before our readers in this notice is divided into three books. Of these the first treats of "*The Organic Substrata of the Animal Body; the Proximate Principles entering into the Composition of the Solids and Fluids of the Organism.*" Although it is essential, for the full understanding of the science of physiological